# Robotic Assisted Surgery

## Understanding new technologies for knee and hip replacement

A PUBLICATION BY DRSTUARTMACKENZIE.COM.AU

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# What is robotic assisted surgery?

Knee and hip surgery have come a long way. There have been many innovations over the 50 years that hip and knee replacements have been performed. One of the most recent and exciting is the use of robotic assistance in hip and knee replacement surgery.

Robotic assisted orthopaedic surgery has been in use since 2009, initially only for partial knee replacement with total hip replacement introduced in 2010. Initially only available in the United States, robotic orthopaedics was only introduced into Australia recently. The first robotic assisted partial knee replacement in Australia was performed in April 2015 and the first robotic assisted hip replacement in June 2016. Dr Stuart MacKenzie did the first robotic assisted hip and knee replacements in Newcastle and the Hunter in October 2016.

During a robotic assisted hip or knee replacement the robot helps the surgeon to position the artificial joint replacement parts more precisely than can be achieved through traditional means.


Prior to the surgery a CT scan is used to generate a 3D computer model of the patient's hip or knee. The surgeon then uses this to plan precisely where the prosthetic implants should be placed for optimal function of the hip or knee replacement. Additional information is gathered at the time of the surgery and this plan can be refined during the operation. This planning is more accurate than traditional planning using a plain x-ray.

Once the planned position of the hip or knee replacement is finalised the robot assists the surgeon to perform the surgery and position the replacement much more accurately than the surgeon is able to do through traditional techniques.

Surgical tools are connected to the robotic arm and the surgeon holds the arm and controls the tools during the surgery. The robot guides the surgeon during preparation of the bone and placement of the hip or knee replacement to achieve the best accuracy and precision possible.

# Advantages of robotic assisted surgery

The main advantage of robotic assisted partial knee or total hip replacement is the ability to more accurately position the hip or knee replacement components.

During the planning phase, the planned component position can be adjusted in 0.2mm or 1 degree increments. The robot then helps within 1mm and 2 degrees of this plan. This is far more accurate than a surgeon is able to be without robotic assistance.

Studies have shown that with traditional techniques the socket part of a hip replacement is positioned outside the recognised safe zone 30% of the time or more. This increases the risk of dislocation. It can also lead to the hip replacement wearing out faster. Using robotic assisted surgery is far more accurate at positioning the socket of the hip replacement, with some studies showing no sockets positioned outside the safe zone.

With partial knee replacement surgery, the position of the replacement components and the overall alignment of the leg are critical in preventing failure of the partial knee replacement. Inaccurate positioning can lead to early failure of the partial knee replacement. Incorrect alignment of the leg can lead to accelerated development of arthritis in the un-replaced parts of the knee end the need for re-operation.

As well as being more accurate with positioning the partial knee replacement, robotic assisted surgery also allows measuring and, if necessary, adjusting the alignment of the leg. This aims to prevent early failures of the partial knee replacement and to prevent development of arthritis in the un-replaced parts of the knee.

# What's the alternative to robotic assisted surgery?

Not every patient is suitable for robotic assisted surgery and not every type of operation can be performed using robotic assisted surgery. In these instances the traditional techniques for total hip replacement and knee replacement have very good results and are still very good operations. You should discuss with your surgeon whether robotic assisted surgery is appropriate for you.

No single approach is a one-size-fits-all answer for all conditions requiring surgery.

# Can I trust this procedure?

Although robotic assisted orthopaedic surgery is new is Australia it has been in use in America for a significantly longer period of time with good results.

The robot assists with making the surgery more accurate and precise but does not significantly change the way the surgery is done otherwise. For hip replacement, the surgery can be done either through a direct anterior approach or a posterior approach depending on what is appropriate for the patient.

The partial knee replacement used with robotic assisted surgery has shown good results over an extended period of time.

Dr MacKenzie uses the same hip replacement parts for robotic assisted total hip replacement as he does for the traditional method of total hip replacement. This is the Exeter hip system which is the most commonly used hip replacement in Australia. The Exeter hip replacement is considered the “gold standard” in hip replacements.

# How to prepare for robotic assisted surgery

Once patient and surgeon agree that surgery is the best option, it's important to learn what to expect from the surgery and create a treatment plan for the best recovery and most positive results afterward.

Mental and physical preparation for surgery is an important step toward a successful outcome. Understanding the process in each step, and the importance of the patient's role and participation in it, will help them recover more quickly and have fewer problems.

Prior to the surgery you will need to have a CT scan to allow for the pre-operative planning for the robotic assisted surgery. Dr MacKenzie will organise this for you at the time your surgery is organised. You will also need to have some pre-operative blood tests which Dr Mackenzie will organise.

- Medications will be discussed to see if any should be stopped before surgery.
- Pre-operative physiotherapy may be organised to get you as strong as possible for the surgery.
- If the patient smokes, they should stop or cut down to reduce the surgery risks and improve recovery.
- Eating a well-balanced diet in the days leading up to the surgery is mostly recommended to best prepare the body to undergo an operation.
- Any infection should also be reported. In fact, surgery cannot be performed until all infections have cleared up.

# How Dr Stuart MacKenzie works with robotics

*"The first step is to obtain a CT scan a few weeks before the surgery. I then produce a 3D virtual model of the patient's knee or hip. This allows me to see the patient's anatomy and plan the best size and position of the implants for the individual patient's anatomy.*

*At the time of the operation, further information is gathered during the surgery and the robotic surgical plan can be adjusted as required. Once the plan is finalised, I then use the robotic arm to help me prepare the bone to receive the prosthesis with the best possible fit.*

*Once the bone has been prepared, the robotic arm then also helps position the prosthesis with the greatest possible accuracy."*

# How much does it cost?

The only additional cost for robotic assisted surgery is the cost of the pre-operative CT scan. This is around $100.

**CALL DR MACKENZIE TODAY**
for a consultation and to discuss possible solutions to your knee or hip discomfort **(02) 4963 3393**

Dr Stuart MacKenzie